U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB80-113798

EPA-Peugeot Light Duty Diesel Correlation Program (1978) Correlation Program Report

(U.S.) Environmental Protection Agency, Ann Arbor, MI

Jan 79

United States
Environmental Protection
Agency

Motor Vehicle Emission Lab
2565 Plymouth Road
Ann Arbor, Michigan 48105

TAEB 79-6
January 1979

PB80-113798

EPA

Correlation Program Report

1978 EPA-PEUGEOT LIGHT DUTY DIESEL CORRELATION PROGRAM

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U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

TECHNICAL REPORT DATA

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1. REPORT NO. TAEB-79-6	2.
3. RECIPIENT'S ACCESSION NO. PB 80 113798	
4. TITLE AND SUBTITLE: 1978 EPA-Peugeot Light Duty Diesel Correlation Program	5. REPORT DATE: January 1979
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S): (no author)	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Technology Assessment & Evaluation Branch Motor Vehicle Emission Laboratory U.S. Environmental Protection Agency 2565 Plymouth Road Ann Arbor, Michigan 48105	10. PROGRAM ELEMENT NO.
	11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS: Same as box 9	13. TYPE OF REPORT AND PERIOD COVERED: Technical
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

This report is a result of a request for a specific correlation program between the EPA laboratory and Peugeot Automobiles of France. The purpose of the program was to investigate the difference in Hydrocarbon emissions measured on Diesel vehicles at the EPA and Peugeot. The possibility of the offset being fuel related was of primary concern to Peugeot and the program was designed to explore this. This report presents and discusses data collected thru December 1978. Testing is still being done on the vehicle.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Diesel engines Passenger vehicles	Hydrocarbon emissions Light duty vehicles	

18. DISTRIBUTION STATEMENT: unlimited	19. SECURITY CLASS *(This Report)*: unclassified	21. NO. OF PAGES: 56
	20. SECURITY CLASS *(This page)*: unclassified	22. PRICE: A04-A01

EPA Form 2220-1 (9-73)

1978 EPA-Peugeot Light Duty Diesel Correlation Program

Technology Assessment and Evaluation Branch
U.S. Environmental Protecion Agency
Motor Vehicle Emission Laboratory
2565 Plymouth Road
Ann Arbor, Michigan 48105

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1. Foreward

In March 1978, a request for a specific correlation program between the EPA laboratory and Peugeot Automobiles of France was discussed and accepted. The purpose of the program was to investigate the difference in Hydrocarbon emissions measured on Diesel vehicles at the EPA and Peugeot. The possiblity of the offset being fuel related was of primary concern to Peugeot and the program was designed to explore this. Testing is still being done on the vehicle and this report presents and discusses data collected thru December 1978.

2. Summmary

The following observations can be made from this correlation program:

* There was a definite offset at all participating laboratories in HC-HFID emission measurements between the test fuel normally used by EPA (supplied by AMOCO) and a test fuel with higher Cetane Number (supplied by Howell Hydrocarbons). Both fuels met Federal Register specifications. This offset was approximately 38% for the hot LA-4 cycle and 46% for the 25 mph steady state tests. The AMOCO fuel produced higher emissions.

* A lab to lab difference of about 35% (EPA higher) exists between the EPA and many other laboratories in measuring HC-HFID emissions on the same fuel. This lab to lab offset was also exhibited in the 1977 EPA-Industry LDD correlation program (report CORR 7801-RL) in which Peugeot participated. Southwest Research Institute, who also participated in the Peugeot program, did a follow-up study of this offset between their lab and EPA. By bringing their equipment to EPA, they were able to diagnose and correct most of the difference. The SwRI summary of the corrective actions taken is included in Appendix 3.

* Peugeot's contention that Cetane Number is the best variable in determining fuel quality can not be conclusively proven by this program. The two fuels used were different in composition as well as Cetane Number. A base fuel and the base fuel with an additive to increase Cetane Number are recommended for future work if Cetane Number is to be studied. Also, the previous EPA-Industry correlation (in which EPA used another low Cetane fuel) showed no such offset due to fuel differences.

* Lab to lab and fuel to fuel variability in CO emissions in this program as compared to the EPA-Industry program (in which a Mercedes and a GM vehicle were used) seem to indicate that CO emissions from the Peugeot vehicle used here were more sensitive to fuel differences than the other diesel vehicles.

3. Technical discussion

3.1 Program Objective

This program was designed to investigate the possibility that the offset in Diesel Hydrocarbon emissions measured at the EPA and Peugeot laboratories was fuel related. EPA has measured HC two to three times higher than the Peugeot laboratories.

Peugeot contends that the EPA fuel has a Cetane Number lower than Peugeot's test fuel and that this difference causes markedly higher Hydrocarbon emissions at EPA.

3.2 Program Design

The test program was designed to produce stable emissions at all test sites. Two fuels were used: A) EPA's normal Diesel #2 test fuel (supplied by AMOCO) and B) A Diesel #2 test fuel specified by Peugeot (supplied by Howell Hydrocarbons). Two test procedures were run with each fuel giving a total of two hot start LA-4 cycles and two 25 m.p.h. steady state tests per fuel at each lab. The test sequence used at all sites is given in Table 1.

3.3 Facilities and Equipment

3.3.1 Test sites

The following laboratories have participated in this correlation program:

Peugeot - Belchamp (April 21 & 22, 1978)
Mercedes Benz (May 31 & June 1, 1978)
Volkswagen (June 6 & 7, 1978)
Ricardo (June 13 & 14, 1978)
Peugeot - Paris (June 19, 1978)
EPA (July 1 & 2, 1978)
C.A.R.B. (September 13 & 14, 1978)
Southwest Res. Inst. (October 24, 1978)
GM (January, 1979)

All test equipment at each laboratory met Federal Register specifications.

Table 1
1978 Peugeot Diesel Correlation Test Sequence

1. Drain fuel.
2. Fill tank with Fuel A.
3. Precondition - 1 LA-4 cycle.
4. Engine off for 10 minutes.
5. Perform a hot start LA-4 cycle (emission samples taken - 2 bags).
6. Perform coast downs (time from 55-45 and 55-20 mph, repeat once).
7. Engine off for 15 minutes.
8. Perform steady state test, 25 mph for 15 minutes. (Emission samples taken, 2 bags last 10 minutes)
9. Repeat steps 3,4,5,7,8 once.
10. Drain fuel.
11. Refill with Fuel B.
12. Repeat steps 3,4,5,7,8 twice.

3.3.2 Test Vehicle

One vehicle was used for all testing done in this program. The vehicle was a 1978 Peugeot 504 Sedan Diesel. The car was instrumented with thermocouples in the engine & exhaust, which were connected to a recorder, and a drive-shaft torque-meter. The vehicle was not modified in any other way.

4. Test Results

The Hot Start LA-4 cycle tests are summarized in Table 2. The steady state results are summarized in Table 3. Individual test results at each lab are given in appendices 1 (Hot Tests) and 2 (Cruise 25). All labs followed the test sequence with the exception of Peugeot-Paris, which ran only 1 test per fuel. Southwest Research ran three HC analyzers on the exhaust samples. All data presented from Southwest in this report appear in triplicate. Only the HC measurements are different. Individual test data from C.A.R.B. and GM are not included because the data could not be provided to EPA prior to the completion of this report.

Fuel analyses were performed by Ethyl Corporation on the test fuels. The results are given in Table 4 and a graph of the distillation curves of the fuels is given in Figure 1.

5. Data Discussion

5.1 HC Emissions

Hydrocarbons were the main concern of this program. Previous HFID data has shown as much as a 100% discrepancy between Peugeot and EPA measurements. This is a long-standing problem which has appeared in the 1978 certification tests on the Peugeot vehicle and in the EPA-Industry Diesel Correlation Program of 1977. (EPA Report - CORR 7801-RL).

The test data from this program shows that there is a significant difference in the HFID emissions between the two fuels. Looking at the difference in each lab shows an average offset of 38% (Fuel A higher) for the Hot LA-4 tests. Similarly, an offset of 46% was calculated for the steady state tests.

On the same fuel, there was a significant offset between the EPA lab and the other participants. EPA measured the highest HFID emissions for both test procedures on both fuels. These results are shown in Figure 2. This difference was also seen in previous programs with these labs. GM data is expected to agree with EPA based on previous results. Their data was not received in time for this report.

PEUGEOT CORP. HOT VIN Z977501 INERTIA WT 3500 ACTUAL HP 12.3

LAB	N		HFID	CO	NOX	CO2	FE	BARO	HUM	NMFC	DBL	MSL	TLOSS
			<-------G/MI-------->				(MPG)	(IN-HG)	(GRAINS /LB)	<---(GRAMS)--->			
EPA (AMOCO FUEL)	2	MEAN	0.610	1.60	1.16	352.	28.6	29.08	71.49	0.98			
		STANDARD DEV.	.0990	0.141	.028	6.	0.4	0.0	4.568	.021			
		C.V.%	16.2	8.8	2.4	1.6	1.2	0.0	6.39	2.12			
EPA (HOWELL FUEL)	2	MEAN	0.375	1.20	1.14	341.	29.6	29.06	74.83	1.00			
		STANDARD DEV.	.0071	0.041	.007	2.	0.1	0.0	2.382	.011			
		C.V.%	1.9	0.1	0.6	0.6	0.5	0.0	3.18	1.12			
PEUGEOT-BELCHAMP (AMOCO FUEL)	2	MEAN	0.362	1.25	1.08	308.	32.9	30.07	36.87	0.85			
		STANDARD DEV.	.0170	0.122	.014	8.	0.8	0.0	0.417	.002			
		C.V.%	4.7	9.8	1.3	2.5	2.6	0.0	1.13	0.22			
PEUGEOT-BELCHAMP (HOWELL FUEL)	2	MEAN	0.255	1.03	1.13	345.	29.4	30.19	53.96	0.91			
		STANDARD DEV.	.0141	0.006	.007	10.	0.8	0.019	0.728	.003			
		C.V.%	5.5	0.5	0.6	2.9	2.9	0.06	1.35	0.31			
PEUGEOT-PARIS (AMOCO FUEL)	1	MEAN	0.450	2.12	0.98	347.	29.0	28.93	62.62	0.94			
		STANDARD DEV.	.0	0.0	.0	0.	0.0	0.0	0.0	.0			
		C.V.%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
PEUGEOT-PARIS (HOWELL FUEL)	1	MEAN	0.273	1.76	1.00	354.	28.6	28.93	57.50	0.92			
		STANDARD DEV.	.0	0.0	.0	0.	0.0	0.0	0.0	.0			
		C.V.%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
MERCEDES BENZ (AMOCO FUEL)	2	MEAN	0.465	1.35	0.97	330.	30.6	29.27	58.99	0.93			
		STANDARD DEV.	.0071	0.078	.021	1.	0.1	0.027	0.0	.0			
		C.V.%	1.5	5.7	2.2	0.4	0.5	0.09	0.0	0.0			
MERCEDES BENZ (HOWELL FUEL)	2	MEAN	0.204	0.96	1.00	337.	30.2	29.15	53.80	0.91			
		STANDARD DEV.	.0651	0.028	.014	5.	0.4	0.027	3.458	.013			
		C.V.%	31.9	2.9	1.4	1.5	1.4	0.09	6.43	1.48			
VOLKSWAGEN (AMOCO FUEL)	2	MEAN	0.425	1.61	1.02	365.	27.8	29.78	59.47	0.93			
		STANDARD DEV.	.0919	0.099	.035	4.	0.4	0.084	1.386	.006			
		C.V.%	21.6	6.1	3.4	1.0	1.3	0.28	2.33	0.62			
VOLKSWAGEN (HOWELL FUEL)	2	MEAN	0.230	1.23	1.03	362.	28.0	29.37	62.85	0.95			
		STANDARD DEV.	.0141	0.120	.035	12.	0.9	0.095	1.343	.006			
		C.V.%	6.1	9.7	3.3	3.3	3.3	1.68	2.14	0.61			
~~RICARDO~~ (AMOCO FUEL)	~~2~~	~~MEAN~~	~~0.433~~	~~1.38~~	~~1.04~~	~~355.~~	~~28.8~~	~~30.09~~	~~53.87~~	~~0.91~~			
		STANDARD DEV.	.0276	0.127	.042	4.	0.4	0.016	6.541	.025			
		C.V.%	6.4	9.2	4.0	1.0	1.2	0.05	12.14	2.80			
RICARDO (HOWELL FUEL)	2	MEAN	0.277	1.02	1.09	353.	28.8	30.22	48.96	0.89			
		STANDARD DEV.	.0163	0.053	.029	6.	0.5	0.016	2.277	.009			
		C.V.%	5.9	5.2	2.6	1.8	1.7	0.05	4.65	0.96			
SOUTHWEST RES INST (AMOCO FUEL) (SWRI ANALYZER)	2	MEAN	0.420	1.57	0.95	376.	26.8	29.27	52.49	0.90			
		STANDARD DEV.	.0	0.021	.014	4.	0.3	0.0	2.008	.008			
		C.V.%	0.0	1.3	1.5	1.1	1.1	0.0	3.83	0.85			
SOUTHWEST RES INST (HOWELL FUEL) (SWRI ANALYZER)	2	MEAN	0.295	1.24	0.97	367.	27.5	29.25	62.11	0.94			
		STANDARD DEV.	.0354	0.064	.048	6.	0.4	0.0	3.344	.014			
		C.V.%	12.0	5.1	5.1	1.5	1.5	0.0	5.38	1.48			
SOUTHWEST RES INST (AMOCO FUEL) (BECKMAN NO. 2)	2	MEAN	0.460	1.57	0.95	376.	26.8	29.27	52.49	0.90			
		STANDARD DEV.	.0424	0.021	.014	4.	0.3	0.0	2.008	.008			
		C.V.%	9.2	1.3	1.5	1.1	1.1	0.0	3.83	0.85			
SOUTHWEST RES INST (HOWELL FUEL) (BECKMAN NO. 2)	2	MEAN	0.300	1.24	0.97	367.	27.5	29.25	62.11	0.94			
		STANDARD DEV.	.0424	0.064	.048	6.	0.4	0.0	3.344	.014			
		C.V.%	14.1	5.1	5.1	1.5	1.5	0.0	5.38	1.48			
SOUTHWEST RES INST (AMOCO FUEL) (BECKMAN NO. 3)	1	MEAN	0.440	1.59	0.94	373.	27.0	29.28	53.91	0.91			
		STANDARD DEV.	.0	0.0	.0	0.	0.0	0.0	0.0	.0			
		C.V.%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
SOUTHWEST RES INST (HOWELL FUEL) (BECKMAN NO. 3)	2	MEAN	0.340	1.24	0.97	367.	27.5	29.25	62.11	0.94			
		STANDARD DEV.	.0283	0.064	.048	6.	0.4	0.0	3.344	.014			
		C.V.%	8.3	5.1	5.1	1.5	1.5	0.0	5.38	1.48			

C.V.% IS THE COEFFICIENT OF VARIATION. (STD. DEV./ EPA *100).
DIFF.% IS THE DIFFERENCE OF THE MEANS BETWEEN THE HFID AND EPA LABS. (HFID-EPA/EPA *100).

TABLE 3. LAB CORRELATION SUMMARY PROCESSED: JAN 14, 1979

PEUGEOT CORR. CR25 VIN 2677501 INERTIA WT 3500 ACTUAL HP 12.3

LAB	N		HFID	CO	NOX	CO2	FE	RAMO	MUM	NMHC	DBL	HSL	TLOSS
			(<-------G/MI-------->)				(MPG)	(IN-HG)	(GRAINS /LB)		(<---(GRAMS)--->		
EPA (AMOCO FUEL)	4	MEAN	0.313	1.01	0.81	194.	52.1	29.09	71.00	0.98			
		STANDARD DEV.	.0600	0.120	.015	5.	1.4	0.016	2.822	.013			
		C.V.%	19.2	11.9	1.8	2.5	2.6	0.05	3.97	1.30			
EPA (HOWELL FUEL)	4	MEAN	0.161	0.49	0.83	193.	52.5	29.04	73.21	0.99			
		STANDARD DEV.	.0092	0.052	.042	3.	0.9	0.019	1.080	.005			
		C.V.%	5.7	10.7	5.1	1.8	1.7	0.07	1.48	0.52			
PEUGEOT-BELCHAMP (AMOCO FUEL)	3	MEAN	0.190	0.76	0.79	159.	63.8	30.07	45.52	0.88			
		STANDARD DEV.	.0179	0.040	.046	13.	5.0	0.0	12.657	.046			
		C.V.%	9.4	5.2	5.8	8.2	7.8	0.0	27.81	5.23			
PEUGEOT-BELCHAMP (HOWELL FUEL)	4	MEAN	0.116	0.63	0.90	177.	57.4	30.19	54.47	0.91			
		STANDARD DEV.	.0090	0.012	.033	2.	0.8	0.019	0.0	.001			
		C.V.%	7.7	1.8	3.7	1.3	1.4	0.06	0.0	0.11			
PEUGEOT-PARIS (AMOCO FUEL)	2	MEAN	0.221	1.33	0.67	192.	52.6	28.93	62.62	0.94			
		STANDARD DEV.	.0106	0.001	.001	6.	1.5	0.0	0.0	.0			
		C.V.%	4.8	0.1	0.2	2.9	2.8	0.0	0.0	0.0			
MERCEDES BENZ (AMOCO FUEL)	2	MEAN	0.210	0.94	0.74	194.	52.1	29.25	59.35	0.93			
		STANDARD DEV.	.0141	0.014	.014	0.	0.0	0.0	0.515	.002			
		C.V.%	6.7	1.5	1.9	0.0	0.0	0.0	0.87	0.23			
MERCEDES BENZ (HOWELL FUEL)	2	MEAN	0.074	0.43	0.78	192.	53.0	29.13	56.50	0.92			
		STANDARD DEV.	.0120	0.024	.001	3.	0.7	0.0	0.0	.001			
		C.V.%	16.1	5.6	0.1	1.5	1.3	0.0	0.0	0.13			
VOLKSWAGEN (AMOCO FUEL)	4	MEAN	0.188	1.08	0.83	212.	47.8	29.75	60.94	0.94			
		STANDARD DEV.	.0080	0.031	.016	3.	0.7	0.038	0.0	.001			
		C.V.%	4.3	2.8	2.0	1.4	1.5	0.13	0.0	0.07			
VOLKSWAGEN (HOWELL FUEL)	4	MEAN	0.069	0.53	0.85	207.	49.1	29.72	61.54	0.94			
		STANDARD DEV.	.0079	0.022	.023	3.	0.7	0.016	0.849	.004			
		C.V.%	11.4	4.1	2.7	1.3	1.4	0.05	1.38	0.39			
RICARDO (AMOCO FUEL)	4	MEAN	0.163	0.78	0.82	200.	50.6	30.09	53.87	0.91			
		STANDARD DEV.	.0098	0.044	.018	3.	0.9	0.016	6.541	.025			
		C.V.%	6.0	5.6	2.2	1.7	1.8	0.05	12.14	2.80			
RICARDO (HOWELL FUEL)	4	MEAN	0.119	0.49	0.83	200.	50.8	30.22	48.98	0.89			
		STANDARD DEV.	.0150	0.051	.022	5.	1.2	0.016	2.277	.009			
		C.V.%	13.1	10.5	2.7	2.5	2.4	0.05	4.65	0.96			
SOUTHWEST RES INST (AMOCO FUEL) (SWRI ANALYZER)	3	MEAN	0.127	0.66	0.62	179.	56.3	29.25	53.00	0.91			
		STANDARD DEV.	.0271	0.035	.023	6.	1.7	0.029	1.668	.006			
		C.V.%	18.2	5.3	3.7	3.1	3.0	0.09	3.15	0.71			
SOUTHWEST RES INST (HOWELL FUEL) (SWRI ANALYZER)	4	MEAN	0.082	0.48	0.67	191.	53.1	29.26	56.91	0.92			
		STANDARD DEV.	.0096	0.049	.024	3.	0.8	0.018	1.182	.005			
		C.V.%	11.6	10.2	3.5	1.5	1.5	0.06	2.08	0.52			
SOUTHWEST RES INST (AMOCO FUEL) (BECKMAN NO. 2)	3	MEAN	0.117	0.66	0.62	179.	56.3	29.25	53.00	0.91			
		STANDARD DEV.	.0231	0.035	.023	6.	1.7	0.026	1.668	.006			
		C.V.%	19.8	5.3	3.7	3.1	3.0	0.09	3.15	0.71			
SOUTHWEST RES INST (HOWELL FUEL) (BECKMAN NO. 2)	4	MEAN	0.080	0.48	0.67	191.	53.1	29.26	56.91	0.92			
		STANDARD DEV.	.0092	0.049	.024	3.	0.8	0.018	1.182	.005			
		C.V.%	11.6	10.2	3.5	1.5	1.5	0.06	2.08	0.52			
SOUTHWEST RES INST (AMOCO FUEL) (BECKMAN NO. 3)	3	MEAN	0.147	0.66	0.62	179.	56.3	29.25	53.00	0.91			
		STANDARD DEV.	.0231	0.035	.023	6.	1.7	0.026	1.668	.006			
		C.V.%	15.7	5.3	3.7	3.1	3.0	0.09	3.15	0.71			
SOUTHWEST RES INST (HOWELL FUEL) (BECKMAN NO. 3)	4	MEAN	0.047	0.48	0.67	191.	53.1	29.26	56.91	0.92			
		STANDARD DEV.	.0125	0.049	.024	3.	0.8	0.018	1.182	.005			
		C.V.%	14.4	10.2	3.5	1.5	1.5	0.06	2.08	0.52			

C.V. IS THE COEFFICIENT OF VARIATION. (STD. DEV./ EPA *100).
DIFF.% IS THE DIFFERENCE OF THE MEANS BETWEEN THE AFR AND EPA LABS. (AFR-EPA/EPA *100).

Table 4
1978 EPA-Peugeot Correlation
Diesel #2 Test Fuel Analysis

Fuel	Fuel A[1]	Fuel B[2]
Viscosity	2.31 Centistokes	2.50 Centistokes
Flash Point	141°F	154°F
Cetane index (Calc.)	45.0	48.5
Cetane Number[3]	42	50
Total Sulfur	0.336% (Wt. %)	0.282% (Wt. %)
% Aromatics by FIA	35.5% (Vol. %)	28.0% (Vol. %)
Gravity °API	34.9	36.7
Distillation-		
Barometer	29.41 in. Hg	29.41 in. Hg
Initial	298°F	314°F
5%	384°F	393°F
10%	404°F	410°F
15%	416°F	421°F
20%	430°F	429°F
30%	450°F	443°F
40%	469°F	461°F
50%	488°F	486°F
60%	507°F	513°F
70%	527°F	537°F
80%	551°F	562°F
85%	566°F	578°F
90%	585°F	599°F
95%	619°F	641°F
Final	641°F	652°F
Recovery	99.3%	99.4%
Residue	0.7%	0.6%
Loss	0.0%	0.0%

1 Fuel A represents fuel in use at EPA at the time the program was run. It was supplied by AMOCO.

2 Fuel B was supplied by Howell Hydrocarbons.

3 Cetane Numbers provided by Peugeot.

FIGURE 1.

TEST FUEL DISTILLATION CURVES

1978 EPA-PEUGEOT CORRELATION PROGRAM

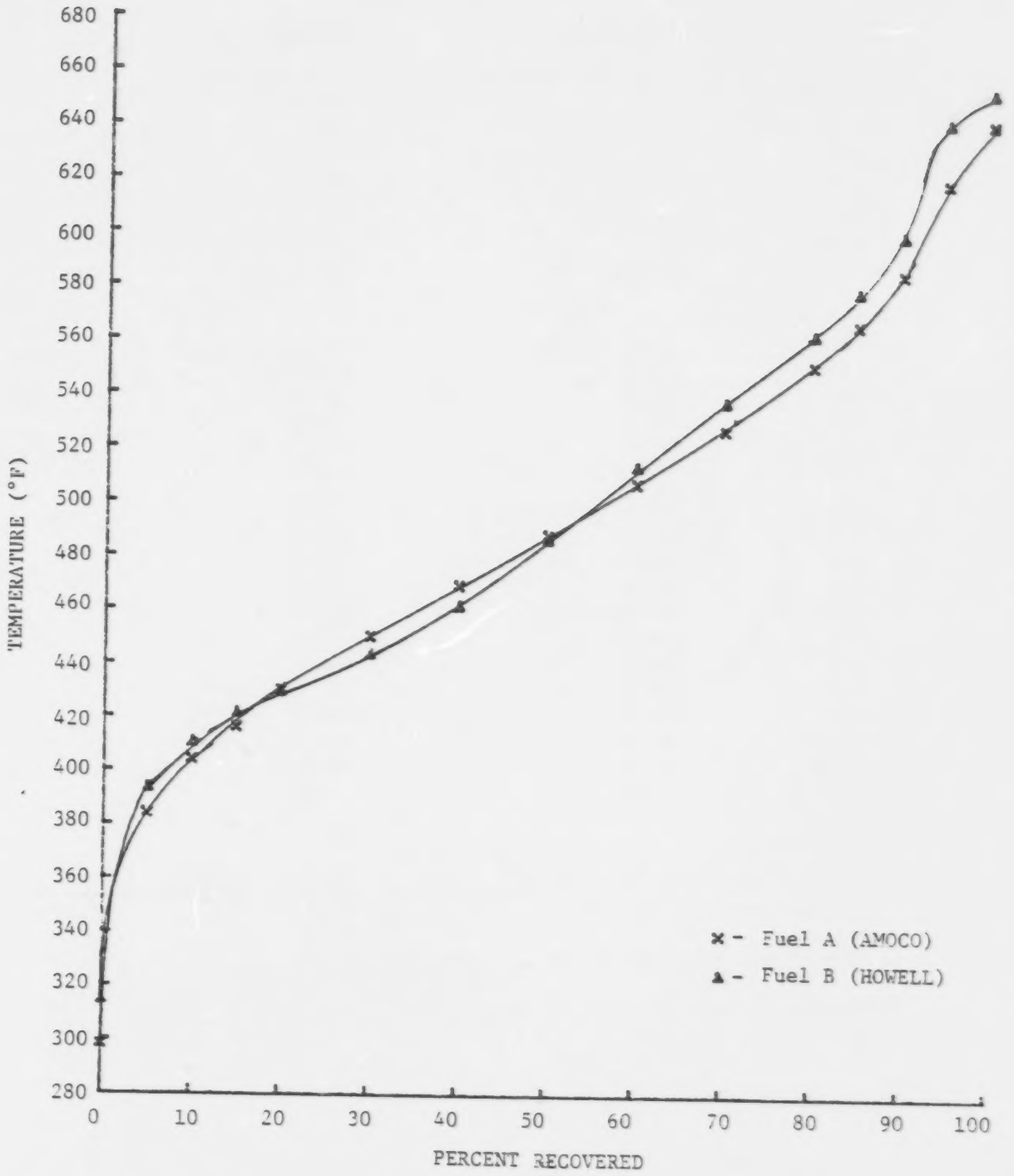
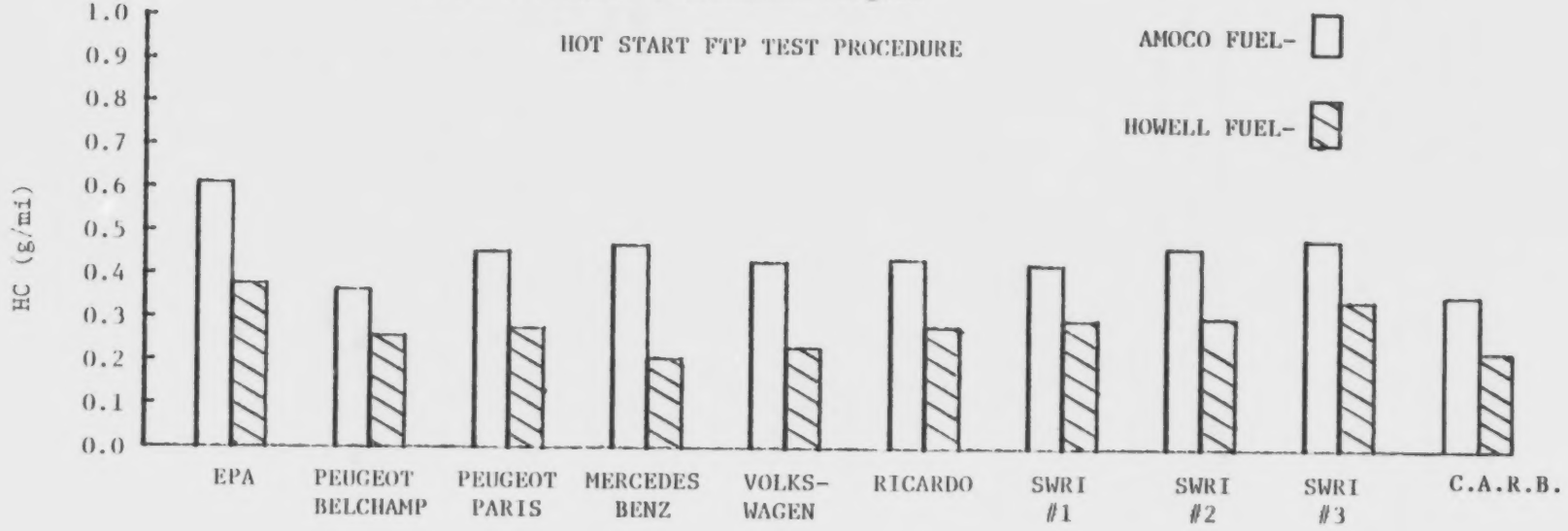
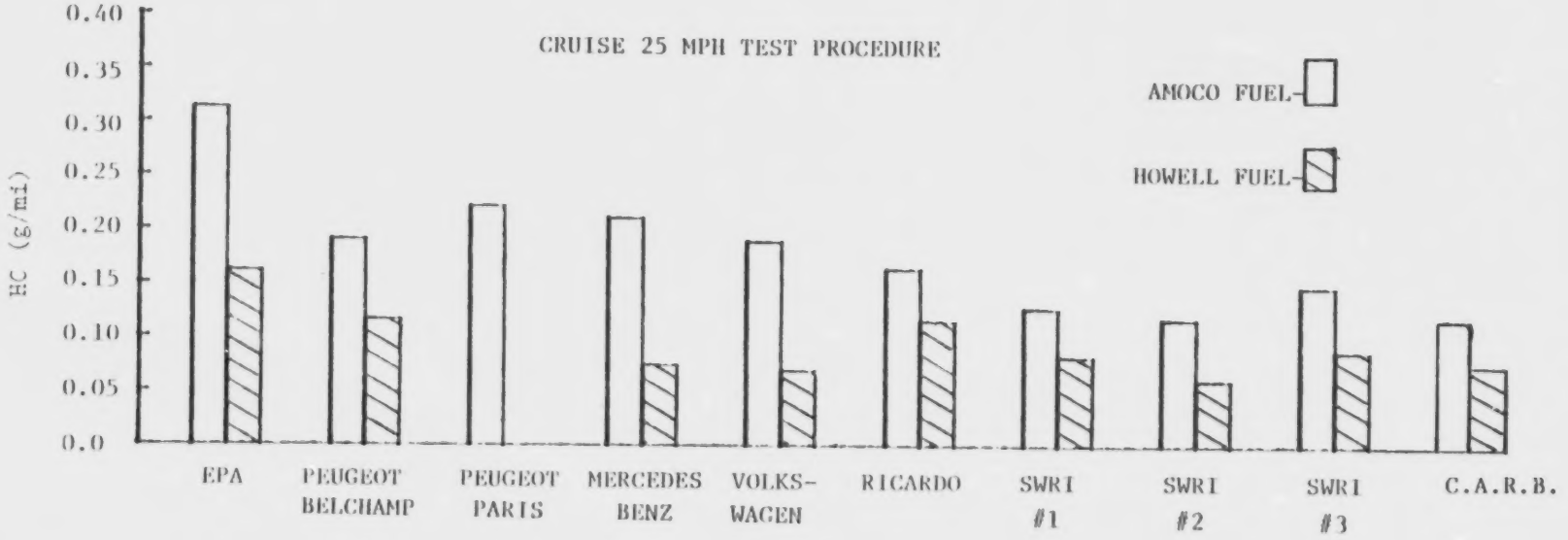


Figure 2
Exhaust Emissions
1978 EPA-Peugeot Correlation Program





Southwest Research Institute was able to diagnose the causes of their offset with EPA by bringing their equipment to Ann Arbor and comparing it to EPA's facility. The SwRI letter summarizing their work is included in Appendix 3 to present an example of how one laboratory was able to resolve its difference with EPA.

5.2 CO Emissions

CO emissions were lower with the Fuel B than with the Fuel A. The offset was approximately 25% lower for the Hot LA-4 cycle and 33% for the steady state tests. Again, however, lab to lab differences were significant.

5.3 NOx Emissions

NOx emissions remained fairly constant between the fuels and labs. A slight offset of 1 to 2% between fuels (Fuel A lower) can be seen.

5.4 Fuel Economy

Fuel economy data exhibited no predictable offset or difference between fuels. Lab to lab variability was fairly low also.

6. Fuel Discussion

The two fuels used in this program were meant to show the difference between the "best" and "worst" that the Federal Register specifications allow. Peugeot contends that the Cetane Number is the best indicator of fuel quality. Since the fuel Cetane number was not varied independently of other fuel parameters it is unlikely that any strong conclusion relating emissions to Cetane number alone can be reached in this program. In the EPA-Industry Correlation Program of 1977 (CORR 7801-RL) the EPA lab also used a 2-D Diesel fuel with a lower Cetane Index than the other participants. However, on neither of the vehicles used there (a Mercedes 300-D and a GM Diesel) was the HC offset as apparent as it is in this program. This could mean the Cetane Number is not the only variable in fuel quality or that perhaps the Peugeot vehicle used here was more sensitive to fuel differences like these. The CO variability tends to support the latter as CO emissions on the Mercedes or GM were very repeatable between labs.

APPENDIX 1

Individual Test Data
EPA - Peugeot Correlation
Hot Start LA-4 Cycle

CORRELATION SUMMARY - TEST DATA

LAB: EPA FUEL: AMOCO VEH: PEUGEOT COLOR, HOT VIN: 2677501 IN-RTIA WT: 3500 ACTUAL HP: 12.3 PROCESSED: MAR 26 1979

DATE	TEST NO	TYPE	METH	CO	NOX	CO2	FE	DRIVER	DYNO	ODO	THP	BARO	MOM	NXFC	DRL	HSL	TLOSS
07-01-78	79-512	HOT		0.540	1.50	1.18	356.	28.3									
07-01-78	79-514	HOT		0.680	1.70	1.14	342.	28.8	0	D006	5612.0	10.1	29.08	08.26	0.97		
									0	D006	5641.0	10.1	29.09	14.72	1.00		
				<------(G/MI)------>			(MPG)						(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->	
MEAN				0.610	1.60	1.16	352.	28.6					29.08	11.49	0.98		
STANDARD DEV.				.0990	0.141	.028	6.	0.4					0.0	4.568	.021		
C.V.				16.2	8.8	2.4	1.5	1.2					0.0	6.4	2.1		

BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	METH	1	2	3	CO 1	CO 2	CO 3	NOX 1	NOX 2	NOX 3	CO2 1	CO2 2	CO2 3	FE 1	FE 2	FE 3
07-01-78	79-512	HOT	D006	A009	0.349	0.064	0.0	1.23	1.83	0.0	1.18	1.18	0.0	362.	351.	0.	27.9	28.7	0.0
07-01-78	79-514	HOT	D006	A009	0.529	0.021	0.0	1.34	1.98	0.0	1.16	1.12	0.0	358.	339.	0.	28.2	29.7	0.0
									(ALL G/MI)								<--(MPG)--->		
MEAN					0.464	0.742	0.0	1.24	1.90	0.0	1.17	1.15	0.0	360.	345.	0.	28.0	29.2	0.0
STANDARD DEV.					0.092	0.111	0.0	0.08	0.10	0.0	0.01	0.04	0.0	3.	8.	0.	0.2	0.7	0.0
C.V.					19.8	15.0	0.0	6.1	5.5	0.0	1.2	3.7	0.0	0.8	2.5	0.0	0.8	2.4	0.0

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE GM AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible] 1979

LAB: EPA FUEL: HOWELL VEH: PEUGEOT [illegible] 604 VIN: 2677501 INERTIA T: 3500 ACTUAL HP: 12.3

DATE	TE TNO	TYPE	HFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	INP	BARO	HUM	NXFC	DBL	HSL	TLOSS
07-01-78	794516	CVT	0.390	1.20	1.14	342.	29.5	0	D006	5662.0	10.1	29.07	73.15	0.99			
07-01-78	794518	CVT	0.370	1.20	1.15	339.	29.7	0	D006	5685.0	10.1	29.05	76.52	1.01			
			<------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		
MEAN			0.375	1.20	1.14	341.	29.6					29.06	74.83	1.00			
STANDARD DEV.			.0071	0.001	.007	2.	0.1					0.0	2.382	.011			
C.V.			1.9	0.1	0.6	0.6	0.5					0.0	3.2	1.1			

BAG DATA

DATE	TE TNO	TYPE	DYNO	SITE	HFID	2	3	CO	2	3	NOX	2	3	CO2	2	3	FE	2	3
07-01-78	794516	CVT	D006	A009	0.386	0.456	0.0	1.02	1.35	0.0	1.16	1.12	0.0	356.	329.	0.	28.5	30.7	0.0
07-01-78	794518	CVT	D006	A009	0.388	0.429	0.0	1.04	1.28	0.0	1.17	1.13	0.0	353.	326.	0.	28.7	31.0	0.0
					(ALL G/MI)												<--(MPG)--->		
MEAN					0.387	0.442	0.0	1.03	1.32	0.0	1.16	1.13	0.0	355.	328.	0.	28.6	30.8	0.0
STANDARD DEV.					0.001	0.019	0.0	0.01	0.05	0.0	0.01	0.01	0.0	2.	2.	0.	0.1	0.2	0.0
C.V.					0.5	4.4	0.0	1.1	3.9	0.0	0.6	0.6	0.0	0.6	0.6	0.0	0.5	0.7	0.0

C.V.S I. THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. S IS THE DIFFERENCE OF THE MEANS BETWEEN THE HFP AND EPA LAB. (MEAN-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR 2, 1979

LAB: PEUGEOT-BELCHAMP FUEL: AMOCO VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA T: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	WEID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DBL	HSL	TLOSS
4-22-78	5	CH	0.350	1.34	1.09	313.	32.3		0 P2		0.0	0.0	30.07	37.16	0.85		
4-22-78	7	CH	0.374	1.17	1.07	302.	33.5		0 P2		0.0	0.0	30.07	36.57	0.85		
			I<------(G/MI)----->				I (MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		
MEAN			0.362	1.25	1.08	308.	32.9					30.07	36.87	0.85			
STANDARD DEV.			.0170	0.122	.014	8.	0.8					0.0	0.417	.002			
C.V.			4.7	9.8	1.3	2.5	2.6					0.0	1.1	0.2			
DIFF.			-26.	-10.	-6.	-11.	13.2					3.	-50.	-14.			

BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	WEID	CO 2	CO 3	NOX 2	NOX 3	CO2 2	CO2 3	FE 2	FE 3
4-22-78	5	HOT	P2		0.283	0.928	0.0	1.06	1.80	0.0	1.07	1.10	0.0	328.	299.	0.	30.9	33.8	0.0
4-22-78	7	HOT	P2		0.294	0.948	0.0	0.89	1.42	0.0	1.04	1.10	0.0	304.	301.	0.	33.4	33.6	0.0
						(ALL G/MI)											I<--(MPG)--->		
MEAN					0.289	0.938	0.0	0.97	1.51	0.0	1.05	1.10	0.0	316.	300.	0.	32.1	33.7	0.0
STANDARD DEV.					0.008	0.014	0.0	0.12	0.13	0.0	0.02	0.00	0.0	17.	1.	0.	1.8	0.1	0.0
C.V.					2.7	1.2	0.0	12.3	8.4	0.0	2.0	0.1	0.0	5.4	0.5	0.0	5.5	0.4	0.0
DIFF.					-25.	-26.	0.	-16.	-6.	0.	-10.	-3.	0.	-12.	-11.	0.	14.	12.	0.

C.V.= I. THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. = IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA — PROCESSED: MAR 20 1979

LAB: PEUGEOT-BELCHAP FUEL: HOWELL VEH: PEUGEOT CORV. HOT VIN: 2677501 INERTIA I: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	MFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	MOM	NXEC	DBL	HSL	TLOSS
4-21-78	1	HOT	0.245	1.02	1.12	338.	30.0	0	P2	0.0	0.0	30.19	53.44	0.91			
4-21-78	3	HOT	0.265	1.03	1.13	352.	28.8	0	P2	0.0	0.0	30.19	54.47	0.91			
			<------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		
MEAN			0.255	1.03	1.13	345.	29.4					30.19	53.96	0.91			
STANDARD DEV.			.0141	0.006	.007	10.	0.8					0.019	0.728	.003			
C.V.			5.5	0.5	0.6	2.9	2.9					0.1	1.3	0.3			
DIFF.			-48.	-27.	-2.	-0.	1.1					4.	-26.	-8.			

MAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	MFID		1	CO	2	3	NOX	2	3	CO2	2	3	FE	2	3
4-21-78	1	HOT	P2		0.217	0.271	0.0	0.89	1.14	0.0	1.05	1.19	0.0	348.	329.	0.	29.2	30.8	0.0
4-21-78	3	HOT	P2		0.239	0.288	0.0	0.91	1.14	0.0	1.06	1.19	0.0	363.	342.	0.	28.0	29.6	0.0
								(ALL G/MI)									<--(MPG)--->		
MEAN					0.228	0.280	0.0	0.90	1.14	0.0	1.06	1.19	0.0	356.	336.	0.	28.6	30.2	0.0
STANDARD DEV.					0.016	0.012	0.0	0.01	0.00	0.0	0.01	0.00	0.0	11.	9.	0.	0.8	0.8	0.0
C.V.*					6.8	4.1	0.0	1.5	0.1	0.0	0.7	0.1	0.0	3.0	2.7	0.0	3.0	2.8	0.0
DIFF.*					-41.	-33.	0.	-22.	-2.	0.	-10.	5.	0.	-0.	-0.	0.	1.	1.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF.* IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR ·· 1979

LAB: PEUGEOT-PARIS FUEL: AMOCO VEH: PEUGEOT CORO. HOT VIN: 2677501 INERTIA WT: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	HFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DBL	HSL	TLOSS
6-19-78	33	HOT	0.450	2.12	0.98	347.	29.0	0	0	0.0	0.0	28.93	62.62	0.94			
			I<------(G/MI)----->				I (MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		

MEAN	0.450	2.12	0.98	347.	29.0		
STANDARD DEV.	.0	0.0	.0	0.	0.0	28.93	62.62	0.94
C.V.%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	.0
DIFF. %	-9.	51.	-15.	0.	-0.1	0.0	0.0	0.0
						-0.	-14.	-5.

BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	HFID	2	3	CO 2	CO 3	NOX 2	NOX 3	CO2 2	CO2 3	FE 2	FE 3	2	3
6-19-78	33	HOT	6		0.314	0.575	0.0	1.57	2.63	0.0	0.95	1.00	0.0	353.	342.	0.	28.6	29.4	0.0
						(ALL G/MI)										I<--(MPG)--->			

MEAN	0.314	0.575	0.0	1.57	2.63	0.0	0.95	1.00	0.0	353.	342.	0.	28.6	29.4	0.0
STANDARD DEV.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.	0.	0.	0.0	0.0	0.0
C.V.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIFF.	-19.	-3.	0.	36.	64.	0.	-19.	-12.	0.	-1.	2.	0.	1.	-2.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible], 1979

LAB: PEUGEOT-PARTS FUEL: HOWELL VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA WT: 4500 ACTUAL H : 12.3

DATE	TEST NO	TYPE	WEID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXEC	DBL	BSL	TLOSS
			I<------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		
6-19-78	35	HOT	0.273	1.76	1.00	354.	28.6			0.0	0.0	28.93	57.50	0.92			
MEAN			0.273	1.76	1.00	354.	28.6					28.93	57.50	0.92			
STANDARD DEV.			.0	0.0	.0	0.	0.0					0.0	0.0	.0			
C.V.%			0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0			
DIFF. %			-45.	26.	-13.	2.	-1.6					-0.	-21.	-7.			

BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	WEID	CO			NOX			CO2			FE		
						2	3		2	3		2	3		2	3	
									(ALL G/MI)						I<--(MPG)--->		
6-19-78	35	HOT	B		0.201	0.340	0.0	1.45	2.03	0.0	0.99	1.01	0.0	360.	349.	0.	28.2	28.9	0.0
MEAN					0.201	0.340	0.0	1.45	2.03	0.0	0.99	1.01	0.0	360.	349.	0.	28.2	28.9	0.0
STANDARD DEV.					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.	0.	0.	0.0	0.0	0.0
C.V.					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIFF.					-48.	-83.	0.	26.	26.	0.	-15.	-11.	0.	1.	4.	0.	-0.	-4.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible], 1979

LAB: MERCEDES BENZ FUEL: AMOCO VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA I: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	HFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXEC	DBL	HSL	TLOSS
			<-------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRADS)--->		
6- 1-78	15	HOT	0.460	1.30	0.99	329.	30.7	0		0.0	0.0	29.25	58.99	0.93			
6- 1-78	13	HOT	0.470	1.41	0.96	331.	30.5	0 7		0.0	0.0	29.29	58.99	0.93			
MEAN			0.465	1.35	0.97	330.	30.6					29.27	58.99	0.93			
STANDARD DEV.			.0071	0.078	.021	1.	0.1					0.027	0.0	.0			
C.V.			1.5	5.7	2.2	0.4	0.5					0.1	0.0	0.0			
DIFF. %			-6.	-3.	-15.	-6.	5.2					1.	-19.	-6.			

BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	HFID	1	3	CO	2	3	NOX	2	3	CO2	2	3	FE	2	3
																	<--(MPG)--->		
6- 1-78	15	HOT			0.355	0.550	0.0	1.15	1.42	0.0	0.95	1.02	0.0	334.	324.	0.	30.3	31.2	0.0
6- 1-78	13	HOT	7		0.350	0.579	0.0	1.12	1.68	0.0	0.92	1.00	0.0	343.	320.	0.	29.6	31.5	0.0
									(ALL G/MI)										
MEAN					0.353	0.564	0.0	1.13	1.55	0.0	0.93	1.01	0.0	339.	322.	0.	29.9	31.3	0.0
STANDARD DEV.					0.004	0.021	0.0	0.02	0.18	0.0	0.02	0.01	0.0	6.	3.	0.	0.5	0.2	0.0
C.V.					1.0	3.6	0.0	1.9	11.9	0.0	2.3	1.4	0.0	1.9	0.9	0.0	1.7	0.7	0.0
DIFF. %					-9.	-5.	0.	-2.	-9.	0.	-20.	-11.	0.	-5.	-4.	0.	6.	4.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DAT: PROCESSED: MAR .. 1979

LAB: MERCEDES BENZ FUEL: UNLEAD VEH: PEUGEOT CORR. NOT VIN: 2677501 INERTIA WT: 3500 ACTUAL WT: 12.1

DATE	TEST NO	TYPE	MFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	INP	BARO	HUM	NXEC	DBL	DSL	TLOSS
5-31-78	9	DOT	0.158	0.94	1.01	340.	29.9	0 7		0.0	0.0	29.17	51.36	0.90			
5-31-78	11	DOT	0.250	0.98	0.99	333.	30.5	0 7		0.0	0.0	29.13	56.25	0.92			
			I<------(G/MI)------>I				(MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		

MEAN	0.204	0.96	1.00	337.	30.2	29.15	53.80	0.91
STANDARD DEV.	.0651	0.028	.014	5.	0.4	0.027	3.458	.013
C.V.	31.9	2.9	1.4	1.5	1.4	0.1	6.4	1.5
DIFF.	-59.	-31.	-13.	-1.	3.9	0.	-26.	-8.

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BAG DATA

DATE	TEST NO	TYPE	DYNO SITE	MFID			CO			NOX			CO2			FE		
					1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
5-31-78	9	DOT	7	0.145	0.140	0.0	0.84	1.04	0.0	0.95	1.07	0.0	351.	331.	0.	29.0	30.7	0.0
5-31-78	11	DOT	7	0.241	0.265	0.0	0.98	1.05	0.0	0.94	1.05	0.0	344.	324.	0.	29.5	31.3	0.0
					(ALL G/MI)											I<--(MPG)--->I		

MEAN	0.193	0.202	0.0	0.87	1.04	0.0	0.94	1.06	0.0	348.	328.	0.	29.3	31.0	0.0
STANDARD DEV.	0.068	0.088	0.0	0.05	0.01	0.0	0.01	0.01	0.0	5.	5.	0.	0.4	0.4	0.0
C.V.	35.2	43.6	0.0	5.7	0.8	0.0	0.8	1.3	0.0	1.4	1.5	0.0	1.2	1.4	0.0
DIFF.	-50.	-66.	0.	-25.	-3.	0.	-19.	-7.	0.	-3.	-3.	0.	1.	3.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible] 1979

LAB: VOLKSWAGEN FUEL: AMOCO VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA I: 3500 ACTUAL IW: 12.3

DATE	TEST NO	TYPE	HFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	HARO	NUM	NXEC	DBL	HSL	TLOSS
6- 6-78	17	HOT	0.360	1.54	1.00	362.	28.0		6		0.0	0.0	29.84	58.49	0.93		
6- 6-78	19	HOT	0.490	1.68	1.05	367.	27.5		6		0.0	0.0	29.72	60.45	0.94		
			I<------(G/MI)------>I				(MPG)						(IN-HG)	(GRAINS /LB)		I<---(G/MMS)--->I	
MEAN			0.425	1.61	1.02	365.	27.8						29.78	59.47	0.93		
STANDARD DEV.			.0919	0.099	.035	4.	0.4						0.084	1.386	.006		
C.V.%			21.6	6.1	3.4	1.0	1.3						0.3	2.3	0.6		
DIFF.			-14.	15.	-11.	5.	-4.6						2.	-19.	-6.		

MAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	HFID		3	CO	2	3	NOX	2	3	CO2	2	3	FE	2	3
6- 6-78	17	HOT	6		0.260	0.450	0.0	1.22	1.53	0.0	0.96	1.04	0.0	364.	360.		0.	27.9	28.1	0.0
6- 6-78	19	HOT	6		0.350	0.620	0.0	1.40	1.93	0.0	1.03	1.07	0.0	370.	365.		0.	27.4	27.8	0.0
						(ALL G/MI)											I<--(MPG)--->I			
MEAN					0.305	0.535	0.0	1.31	1.88	0.0	0.99	1.05	0.0	367.	363.		0.	27.6	27.9	0.0
STANDARD DEV.					0.064	0.120	0.0	0.13	0.07	0.0	0.05	0.02	0.0	4.	4.		0.	0.4	0.4	0.0
C.V.%					20.9	22.5	0.0	9.7	3.8	0.0	5.0	2.0	0.0	1.2	1.0		0.0	1.3	1.3	0.0
DIFF. %					-21.	-10.	0.	13.	17.	0.	-15.	-7.	0.	3.	8.		0.	-2.	-7.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR • 1979

LAB: VOLKSWAGEN FUEL: AMOCO VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA I: 3500 ACTUAL IW: 12.3

DATE	TEST NO	TYPE	MFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODO	IHP	BARO	HUM	NXFC	DBL	HSL	TLOSS
6- 6-78	17	HOT	0.360	1.54	1.00	362.	28.0		0 6	0.0	0.0	29.84	58.49	0.93			
6- 6-78	19	HOT	0.490	1.68	1.05	367.	27.5		0 6	0.0	0.0	29.72	60.45	0.94			
			I<------(G/MI)----->				I (MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		
MEAN			0.425	1.61	1.02	365.	27.8					29.78	59.47	0.93			
STANDARD DEV.			.0919	0.099	.035	4.	0.4					0.084	1.486	.006			
C.V.%			21.6	6.1	3.4	1.0	1.3					0.3	2.3	0.6			
DIFF.			-14.	15.	-11.	5.	-4.6					2.	-19.	-6.			

MAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	MFID	CO 1	CO 2	CO 3	NOX 1	NOX 2	NOX 3	CO2 1	CO2 2	CO2 3	FE 1	FE 2	FE 3
6- 6-78	17	HOT	6		0.260	0.450	0.0	1.22	1.53	0.0	0.96	1.04	0.0	364.	360.	0.	27.9	28.1	0.0
6- 6-78	19	HOT	6		0.350	0.620	0.0	1.40	1.93	0.0	1.03	1.07	0.0	370.	365.	0.	27.4	27.6	0.0
									(ALL G/MI)							I<--(MPG)--->			
MEAN					0.305	0.535	0.0	1.31	1.88	0.0	0.99	1.05	0.0	367.	363.	0.	27.6	27.9	0.0
STANDARD DEV.					0.064	0.120	0.0	0.13	0.07	0.0	0.05	0.02	0.0	4.	4.	0.	0.4	0.4	0.0
C.V.%					20.9	22.5	0.0	9.7	3.8	0.0	5.0	2.0	0.0	1.2	1.0	0.0	1.3	1.3	0.0
DIFF. %					-21.	-10.	0.	13.	17.	0.	-15.	-7.	0.	3.	8.	0.	-0.	-7.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE HFE AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible], 1979

LAB: RICARDO FUEL: AMOCO VEH: PEUGEOT CORD. HOT VIN: 2677501 INERTIA I: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	HFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXEC	DBL	HSL	TLOSS
6-14-78	29	HOT	0.414	1.29	1.09	357.	28.3	0		0.0	0.0	30.09	58.49	0.93			
6-14-78	31	HOT	0.453	1.47	1.03	352.	28.8	0		0.0	0.0	30.09	49.24	0.89			
			<------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		
MEAN			0.433	1.38	1.06	355.	28.6					30.09	53.87	0.91			
STANDARD DEV.			.0276	0.127	.042	4.	0.4					0.016	6.541	.025			
C.V.			6.4	9.2	4.0	1.0	1.2					0.1	12.1	2.8			
DIFF. %			-12.	-1.	-8.	2.	-1.8					3.	-26.	-8.			

BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	HFID	CO 2	CO 3	NOX 2	NOX 3	CO2 2	CO2 3	FE 2	FE 3
6-14-78	29	HOT			0.323	0.498	0.0	1.05	1.52	0.0	1.03	1.15	0.0	358.	357.	0.	28.4	28.3	0.0
6-14-78	31	HOT			0.369	0.530	0.0	1.19	7.73	0.0	1.02	1.05	0.0	351.	352.	0.	28.8	28.7	0.0
						(ALL G/MI)											<--(MPG)--->		
MEAN					0.346	0.514	0.0	1.12	4.62	0.0	1.02	1.10	0.0	355.	355.	0.	28.6	28.5	0.0
STANDARD DEV.					0.033	0.023	0.0	0.10	4.49	0.0	0.01	0.07	0.0	5.	4.	0.	0.3	0.3	0.0
C.V.					9.4	4.4	0.0	9.1	95.1	0.0	0.7	6.4	0.0	1.4	1.0	0.0	1.0	1.0	0.0
DIFF. %					-10.	-13.	0.	-3.	187.	0.	-12.	-3.	0.	-1.	5.	0.	1.	-5.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE UEP AND EPA LAB. (MER-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR • 1979

LAB: RICARDO FUEL: HOWELL VEH: PEUGEOT CORO. HOT VIN: 2677501 INERTIA I: 3500 ACTUAL W: 12.3

DATE	TEST NO	TYPE	MFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	TRIM	NXEC	DBL	LSL	TLOSS
6-13-78	25	HOT	0.266	0.98	1.07	357.	28.5		0	0.0	0.0	30.22	47.35	0.88			
6-13-78	27	HOT	0.289	1.05	1.11	348.	29.2		0	0.0	0.0	30.22	50.57	0.90			
			<------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		
MEAN			0.277	1.02	1.09	353.	28.8					30.22	48.96	0.89			
STANDARD DEV.			.0163	0.053	.028	6.	0.5					0.016	2.277	.009			
C.V.%			5.9	5.2	2.6	1.9	1.7					0.1	4.7	1.0			
DIFF. %			-44.	-27.	-5.	2.	-0.8					4.	-33.	-10.			

BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	MFID	CO 1	CO 2	CO 3	NOX 1	NOX 2	NOX 3	CO2 1	CO2 2	CO2 3	FE 1	FE 2	FE 3
6-13-78	25	HOT			0.232	0.298	0.0	0.90	1.05	0.0	1.05	1.10	0.0	367.	346.	0.	27.6	29.3	0.0
6-13-78	27	HOT			0.237	0.337	0.0	0.90	1.19	0.0	1.09	1.13	0.0	356.	340.	0.	28.5	29.8	0.0
						(ALL G/MI)											<--(MPG)--->		
MEAN					0.234	0.317	0.0	0.90	1.12	0.0	1.07	1.11	0.0	362.	343.	0.	28.1	29.6	0.0
STANDARD DEV.					0.004	0.028	0.0	0.00	0.10	0.0	0.03	0.02	0.0	8.	4.	0.	0.6	0.4	0.0
C.V.%					1.5	9.7	0.0	0.1	9.1	0.0	2.6	1.9	0.0	2.2	1.2	0.0	2.3	1.2	0.0
DIFF. %					-39.	-06.	0.	-22.	-11.	0.	-8.	-2.	0.	1.	2.	0.	-1.	-2.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: [illegible] 1979

LAB: SOUTHWEST RES INST FUEL: AMOCO VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA WT: 3500 ACTUAL HP: 12.5

DATE	TEST NO	TYPE	MEID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DBL	HSL	TLOSS
10-24-78	11	HOT	0.420	1.56	0.96	379.	26.6		1 SWRI	6019.0	10.4	29.28	51.07	0.90			
10-24-78	14	HOT	0.420	1.59	0.94	373.	27.0		1 SWRI	6034.0	10.4	29.26	53.91	0.91			
			I<------(G/MI)------>I				(MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->I		
MEAN			0.420	1.57	0.95	376.	26.8					29.27	52.49	0.90			
STANDARD DEV.			.0	0.021	.014	4.	0.3					0.0	2.008	.008			
C.V.			0.0	1.3	1.5	1.1	1.1					0.0	3.	0.9			
DIFF.			-15.	13.	-18.	9.	-7.8					1.	-28.	-9.			

BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	MEID	CO 2	CO 3	CO	NOX 2	NOX 3	NOX	CO2 2	CO2 3	CO2	FE 2	FE 3	FE
10-24-78	11	HOT	SWRI	1	0.420	0.320	0.510	0.0	1.23	1.87	0.0	0.96	0.96	0.0	381.	377.	0.
10-24-78	14	HOT	SWRI	1	0.420	0.290	0.540	0.0	1.14	2.01	0.0	0.92	0.95	0.0	367.	379.	0.
										(ALL G/MI)							
MEAN						0.305	0.525	0.0	1.18	1.94	0.0	0.94	0.95	0.0	374.	378.	0.
STANDARD DEV.						0.021	0.021	0.0	0.04	0.10	0.0	0.03	0.01	0.0	10.	1.	0.
C.V.						7.0	4.0	0.0	3.4	5.1	0.0	3.0	0.7	0.0	2.6	0.4	0.0
DIFF.						-21.	-11.	0.	2.	21.	0.	-19.	-16.	0.	5.	12.	0.

DATE	TEST NO	TYPE	DYNO	SITE	MEID	FE 2	FE 3	FE
10-24-78	11	HOT	SWRI	1	0.420	26.5	26.7	0.0
10-24-78	14	HOT	SWRI	1	0.420	27.5	26.6	0.0
						I<--(MPG)--->I		
MEAN						27.0	26.6	0.0
STANDARD DEV.						0.7	0.1	0.0
C.V.						2.6	0.3	0.0
DIFF.						5.	-5.	-11.	0.

C.V.'S IS THE COEFFICIENT OF VARIATION. (STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE SWRI AND EPA LAB. (MEAN-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR . . 1979

LAB: SOUTHWEST RES INST FUEL: HOWELL VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA WT: 3500 ACTUAL HP: 12.4

DATE	TESTNO	TYPE	MFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DRL	HSL	TLOSS
10-24-78	21	HOT	0.270	1.20	0.94	363.	27.8		1 SWRI	6056.0	10.4	29.25	59.75	0.93			
10-24-78	24	HOT	0.320	1.29	1.01	371.	27.2		1 SWRI	6070.0	10.4	29.25	64.41	0.95			
			<-------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		

	CO	NOX	CO2	FE	BARO	HUM	NXFC
MEAN	0.295	1.24	0.97	367.	27.5	29.25	62.11	0.94
STANDARD DEV.	.0354	0.064	.049	6.	0.4	0.0	3.344	.014
C.V.	12.0	5.1	5.1	1.5	1.5	0.0	5.4	1.5
DIFF.	-40.	-11.	-15.	6.	-5.4	1.	-15.	-5.

BAG DATA

DATE	TESTNO	TYPE	DYNO	SITE	MFID	CO 1	CO 2	CO 3	NOX 1	NOX 2	NOX 3	CO2 1	CO2 2	CO2 3	FE 1	FE 2	FE 3
10-24-78	21	HOT	SWRI	1		0.230	0.310	0.0	0.97	1.40	0.0	0.92	0.96	0.0	362.	364.	0.	27.9	27.7	0.0
10-24-78	24	HOT	SWRI	1		0.260	0.370	0.0	1.05	1.50	0.0	1.00	1.03	0.0	378.	365.	0.	26.8	27.6	0.0
									(ALL G/MI)								<--(MPG)--->		

	CO 1	CO 2	CO 3	NOX 1	NOX 2	NOX 3	CO2 1	CO2 2	CO2 3	FE 1	FE 2	FE 3
MEAN	0.245	0.340	0.0	1.01	1.45	0.0	0.96	0.99	0.0	370.	365.	0.	27.3	27.6	0.0
STANDARD DEV.	0.021	0.042	0.0	0.06	0.07	0.0	0.06	0.05	0.0	11.	1.	0.	0.8	0.1	0.0
C.V.	8.7	12.5	0.0	6.1	4.9	0.0	5.9	5.0	0.0	3.1	0.2	0.0	2.8	0.3	0.0
DIFF.	-36.	-43.	0.	-12.	-10.	0.	-18.	-13.	0.	4.	8.	0.	-3.	-8.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible] 1979

LAB: SOUTHWEST RES INST FUEL: AMOCO VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA WT: 4500 ACTUAL HP: 12.5

DATE	TEST NO	TYPE	HFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DBL	HSL	TLOSS
				I<-------(G/MI)------>I			(MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->I		
10-24-78	11	HOT	0.490	1.56	0.96	379.	26.6	1	SWRI	6019.0	10.4	29.28	51.07	0.90			
10-24-78	14	HOT	0.430	1.59	0.94	373.	27.0	1	SWRI	6034.0	10.4	29.26	53.91	0.91			
MEAN			0.460	1.57	0.95	376.	26.8					29.27	52.49	0.90			
STANDARD DEV.			.0424	0.021	.014	4.	0.3					0.0	2.008	.008			
C.V.			9.2	1.3	1.5	1.1	1.1					0.0	3.8	0.9			
DIFF. %			-7.	13.	-18.	9.	-7.8					1.	-28.	-9.			

BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	HFID	2	3	CO	2	3	NOX	2	3	CO2	2	3	FE	2	3
10-24-78	11	HOT	SWRI	1	0.390	0.580	0.0	1.23	1.87	0.0	0.96	0.96	0.0	381.	377.	0.	26.5	26.7	0.0
10-24-78	14	HOT	SWRI	1	0.310	0.550	0.0	1.14	2.01	0.0	0.92	0.95	0.0	367.	379.	0.	27.5	26.6	0.0
						(ALL G/MI)											I<--(MPG)--->I		
MEAN					0.350	0.565	0.0	1.18	1.94	0.0	0.94	0.95	0.0	374.	378.	0.	27.0	26.6	0.0
STANDARD DEV.					0.057	0.021	0.0	0.05	0.10	0.0	0.03	0.01	0.0	10.	1.	0.	0.7	0.1	0.0
C.V. %					16.2	3.8	0.0	5.4	5.1	0.0	3.0	0.7	0.0	2.6	0.4	0.0	2.6	0.3	0.0
DIFF. %					-9.	-5.	0.	2.	21.	0.	-19.	-16.	0.	5.	12.	0.	-5.	-11.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA — PROCESSED: SEP . . 1979

LAB: SOUTHWEST RES INST FUEL: HOWELL VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA I: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	MFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DRL	HSL	TLOSS
				I<------(G/MI)----->			I (MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		
10-24-78	21	HOT	0.270	1.20	0.94	363.	27.8		I SWRI	6056.0	10.4	29.25	59.75	0.93			
10-24-78	24	HOT	0.330	1.29	1.01	371.	27.2		I SWRI	6070.0	10.4	29.25	64.48	0.95			
MEAN			0.300	1.24	0.97	367.	27.5					29.25	62.11	0.94			
STANDARD DEV.			.0424	0.064	.049	6.	0.4					0.0	3.344	.014			
C.V.%			14.1	5.1	5.1	1.5	1.5					0.0	5.4	1.5			
DIFF. %			-30.	-11.	-15.	6.	-5.4					1.	-15.	-5.			

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BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	MFID	CO			NOX			CO2			FE		
						-	2	3	-	2	3	-	2	3	-	2	3
									(ALL G/MI)						I<--(MPG)--->		
10-24-78	21	HOT	SWRI	1	0.240	0.290	0.0	0.97	1.40	0.0	0.92	0.96	0.0	362.	364.	0.	27.9	27.7	0.0
10-24-78	24	HOT	SWRI	1	0.280	0.370	0.0	1.05	1.50	0.0	1.00	1.03	0.0	378.	365.	0.	26.8	27.6	0.0
MEAN					0.260	0.330	0.0	1.01	1.45	0.0	0.96	0.99	0.0	370.	365.	0.	27.3	27.6	0.0
STANDARD DEV.					0.028	0.057	0.0	0.06	0.07	0.0	0.06	0.05	0.0	11.	1.	0.	0.8	0.1	0.0
C.V.%					10.9	17.1	0.0	6.1	4.9	0.0	5.9	5.0	0.0	3.1	0.2	0.0	2.8	0.3	0.0
DIFF. %					-33.	-44.	0.	-12.	-10.	0.	-18.	-13.	0.	4.	8.	0.	-3.	-8.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE GFF AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR -, 1979

LAB: SOUTHWEST RES INST FUEL: AMOCO VEH: PEUGEOT CORP. HOT VIN: 2677501 INERTIA WT: 3500 ACTUAL HP: 12.3

DATE	TESTNO	TYPE	MFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	INP	BARO	HUM	NXFC	DBL	HSL	TLOSS
10-24-78	14	HOT	0.480	1.59	0.94	373.	27.0		SWRI	6034.0	10.4	29.26	53.91	0.91			
			<------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		
MEAN			0.480	1.59	0.94	373.	27.0					29.26	53.91	0.91			
STANDARD DEV.			.0	0.0	.0	0.	0.0					0.0	0.0	.0			
C.V.%			0.0	0.0	0.0	0.0	0.0					0.0	0.0	0.0			
DIFF. %			-3.	14.	-18.	8.	-7.1					1.	-26.	-8.			

BAG DATA

DATE	TESTNO	TYPE	DYNO	SITE	MFID	2	3	CO	2	3	NOX	2	3	CO2	2	3	FE	2	3
10-24-78	14	HOT	SWRI	1	0.340	0.610	0.0	1.14	2.01	0.0	0.92	0.95	0.0	367.	379.	0.	27.5	26.5	0.0
									(ALL G/MI)								<--(MPG)--->		
MEAN					0.340	0.610	0.0	1.14	2.01	0.0	0.92	0.95	0.0	367.	379.	0.	27.5	26.5	0.0
STANDARD DEV.					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.	0.	0.	0.0	0.0	0.0
C.V.%					0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DIFF. %					-12.	3.	0.	-1.	2%.	0.	-21.	-16.	0.	3.	13.	0.	-3.	-12.	0.

C.V.% IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF. % IS THE DIFFERENCE OF THE MEANS BETWEEN THE HFM AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

LAB CORRELATION SUMMARY - TEST DAT

PROCESSED: [illegible] 1979

LAB: SOUTHWEST RES INST FUEL: HOWELL VEH: PEUGEOT [illegible] HOT VIN: 2677501 INERTIA T: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	RFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	INP	BARO	HUM	NXFC	DBL	MSL	TLOSS
10-24-78	21	HOT	0.320	1.20	0.94	361.	27.8		1 SWRI	6056.0	10.4	29.25	59.75	0.93			
10-24-78	24	HOT	0.360	1.29	1.01	371.	27.2		1 SWRI	6070.0	10.4	29.25	64.48	0.95			
			<------(G/MI)------>				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		
MEAN			0.340	1.24	0.97	367.	27.5					29.25	62.11	0.94			
STANDARD DEV.			.0283	0.064	.049	6.	0.4					0.0	3.344	.014			
C.V.			8.3	5.1	5.1	1.5	1.5					0.0	5.4	1.5			
DIFF.			-31.	-11.	-15.	6.	-5.4					1.	-15.	-5.			

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BAG DATA

DATE	TEST NO	TYPE	DYNO	SITE	RFID	CO 1	CO 2	CO 3	NOX 1	NOX 2	NOX 3	CO2 1	CO2 2	CO2 3	FE 1	FE 2	FE 3
10-24-78	21	HOT	SWRI	1	0.270	0.170	0.0	0.97	1.40	0.0	0.92	0.96	0.0	362.	364.	0.	27.9	27.7	0.0
10-24-78	24	HOT	SWRI	1	0.300	0.410	0.0	1.06	1.50	0.0	1.00	1.03	0.0	378.	365.	0.	26.8	27.6	0.0
						(ALL G/MI)										<--(MPG)--->			
MEAN					0.285	0.290	0.0	1.01	1.45	0.0	0.96	0.99	0.0	370.	365.	0.	27.3	27.6	0.0
STANDARD DEV.					0.021	0.028	0.0	0.06	0.07	0.0	0.06	0.05	0.0	11.	1.	0.	0.8	0.1	0.0
C.V.					7.4	9.3	0.0	6.3	4.9	0.0	5.9	5.0	0.0	3.1	0.2	0.0	2.8	0.3	0.0
DIFF.					-26.	-34.	0.	-12.	-10.	0.	-18.	-13.	0.	4.	8.	0.	-3.	-8.	0.

C.V.'S IS THE COEFFICIENT OF VARIATION.(STD. DEV./MEAN *100).
DIFF.'S IS THE DIFFERENCE OF THE MEANS BETWEEN THE MFR AND EPA LAB. (MFR-EPA/EPA *100).
NOTE: THE COMMENTS PERTINENT TO THESE TESTS ARE LOCATED IN THE LAST TABLE OF THIS APPENDIX.

APPENDIX 2

Individual Test Data
EPA - Peugeot Correlation
25 M.P.H. Steady State

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible] 1979

LAB: EPA FUEL: AMOCO VEH: PEUGEOT CO [illegible]. CR25 VIN: 2677561 INERTIA T: 3500 ACTUAL H : 12.3

DATE	TEST NO	TYPE	MFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODO	INP	BARO	HUM	NXFC	DRL	DSL	TLOSS
07-01-78	791513-1	C 25	0.260	0.91	0.82	195.	51.8		0	0006	5626.0	10.1	29.08	69.01	0.97			
	791513-2	C 25	0.264	0.91	0.80	189.	53.4											
07-01-78	791515-1	C 25	0.375	1.15	0.83	200.	50.3		0	0006	5643.0	10.1	29.10	73.00	0.99			
	791515-2	C 25	0.355	1.09	0.80	191.	52.8											
			I<------(G/MI)------>I				(MPG)						(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		
MEAN			0.313	1.01	0.81	194.	52.1						29.09	71.00	0.98			
STANDARD DEV.			.0600	0.120	.015	5.	1.4						0.016	2.822	.013			
C.V.			19.2	11.9	1.8	2.5	2.6						0.1	4.0	1.3			

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: Mar [illegible] 1979

LAB: EPA FUEL: HOWELL VEH: PEUGEOT SOPAC CR25 VIN: 2677501 INERTIA WT: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	HFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	INP	BARO	HUM	NXEC	DRL	DSL	TLOSS
07-01-78	793517-1	C 25	0.149	0.51	0.87	196.	51.7		0 D006	5671.0	10.1	29.05	73.97	1.00			
	793517-2	C 25	0.159	0.52	0.84	188.	53.8										
07-01-78	793519-1	C 25	0.170	0.41	0.84	194.	52.3		0 D006	5693.0	10.1	29.03	72.44	0.99			
	793519-2	C 25	0.166	0.50	0.77	194.	52.1										
			<-------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		
MEAN			0.161	0.49	0.83	193.	52.5					29.04	73.21	0.99			
STANDARD DEV.			.0092	0.052	.042	3.	0.9					0.019	1.080	.005			
C.V.			5.7	10.7	5.1	1.8	1.7					0.1	1.5	0.5			

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR 79

LAB: PEUGEOT-BELCHAMP FUEL: AMOCO VEH: PEUGEOT COLT. CR25 VIN: 2677501 INERTIA : TI 4500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	METH	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DBL	HSL	TLOSS
				(G/MI)			(MPG)					(IN-HG)	(GRAINS /LB)		(GRAINS)		
4-22-78	6-1	CS	0.210	0.81	0.84	174.	58.1	0	PZ		0.0	30.07	54.47	0.91			
4-22-78	8-1	CS	0.186	0.74	0.78	151.	66.8	0			0.0	30.07	36.57	0.85			
	8-2	CS	0.175	0.74	0.75	152.	66.6										
MEAN			0.190	0.76	0.79	159.	63.8					30.07	45.52	0.88			
STANDARD DEV.			.0177	0.040	.046	13.	5.0					0.0	12.657	.046			
C.V.			9.4	5.2	5.8	8.2	7.8					0.0	27.8	5.2			
DIFF.			-20.	2.	-4.	-18.	22.1					3.	-37.	-11.			

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LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR -- 1979

LAB: [illegible] FUEL: UNLEAD VEH: PEUG 01 1.0 L. CAR VIN: 2677501 PARTIAL I: 3500 ACTUAL W: 12.3

DATE	TEST NO	TYPE	HFID (G/MI)	CO (G/MI)	NOx (G/MI)	CO2 (G/MI)	FE (MPG)	DRIVER	DYNO	ODOM	IHP	BARO (IN-HG)	HUM (GRAINS /LB)	NXFC (GRAMS)	DRL (GRAMS)	DSL (GRAMS)	TLOSS (GRAMS)
4-21-78	2-1	[illegible]	0.110	0.63	0.88	174.	58.5		0 P2	0.0	0.0	30.19	54.47	0.91			
	2-2	[illegible]	0.110	0.63	0.91	177.	57.4										
4-21-78	4-1	[illegible]	0.117	0.63	0.88	178.	56.9		0 P2	0.0	0.0	30.19	54.47	0.91			
	4-2	[illegible]	0.124	0.65	0.95	178.	56.9										
MEAN			0.116	0.63	0.90	177.	57.4					30.19	54.47	0.91			
STANDARD DEV.			.0090	0.012	.033	2.	0.8					0.019	0.0	.001			
C.V.			7.7	1.8	3.7	1.3	1.4					0.1	0.0	0.1			
DIFF.			-51.	-16.	10.	-9.	9.9					4.	-24.	-8.			

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR 2, 1979

LAB: PEUGEOT-PARIS FUEL: AMOCO VEH: PEUGEOT COUP. C825 VIN: 2677501 INERTIA WT: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	REID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DHL	HSL	TLOSS
				(G/MI)			(MPG)					(IN-HG)	(GRAINS /LB)		(GRAMS)		
6-19-78	34-1	C-25	0.214	1.33	0.67	188.	53.6			0.0	0.0	28.93	62.62	0.94			
	34-2	C-25	0.229	1.33	0.67	196.	51.5										
MEAN			0.221	1.33	0.67	192.	52.6					28.93	62.62	0.94			
STANDARD DEV.			.0106	0.001	.001	6.	1.5					0.0	0.0	.0			
C.V.			4.8	0.1	0.2	2.9	2.8					0.0	0.0	0.0			
DIFF.			-7.	78.	-18.	-1.	0.5					-0.	-13.	-4.			

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR 2, 1979

LAB: MERCEDES BENZ FUEL: AMOCO VEH: PEUGEOT CORP. CR25 VIN: 2677501 INERTIA I: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	MFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODO:	IHP	BARO	ROOM	NXFC	DRL	HSL	TLOSS
6- 1-78	16-1	CS	0.220	0.95	0.73	194.	52.1		0 /	0.0	0.0	29.25	59.72	0.93			
6- 1-78	14-1	CS	0.200	0.93	0.75	194.	52.1		0 /	0.0	0.0	29.25	58.99	0.93			
			I<------(G/MI)------>I				(MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		
MEAN			0.210	0.94	0.74	194.	52.1					29.25	59.35	0.93			
STANDARD DEV.			.0141	0.014	.014	0.	0.0					0.0	0.515	.002			
C.V.			6.7	1.5	1.9	0.0	0.0					0.0	0.9	0.2			
DIFF.			-11.	2%.	-10.	0.	-0.3					1.	-1%.	-6.			

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LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible] 1979

LAB: MERCEDES BENZ FUEL: HOWELL VEH: PEUGEOT 604 M. CM25 VIN: 2677501 INERTIA WT: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	METD	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	TMP	BARO	HUM	NXFC	DBL	MSL	TLOSS
5-11-78	10-1	CM25	0.083	0.45	0.78	194.	52.5	C	7	0.0	0.0	29.13	56.50	0.92			
5-11-78	12-1	CM25	0.066	0.42	0.78	190.	53.5	C	7	0.0	0.0	29.13	56.50	0.92			
			I<------(G/MI)----->				I (MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAINS)--->		

MEAN	0.074	0.43	0.78	192.	53.0			
STANDARD DEV.	.0120	0.024	.001	3.	0.7	29.13	56.50	0.92
C.V.	16.1	5.6	0.1	1.5	1.3	0.0	0.0	.001
DIFF.	-69.	-42.	-5.	-1.	1.4	0.0	0.0	0.1
						0.	-22.	-7.

LAB CORRELATION SUMMARY - TEST DATA PROCESSED: MAR [illegible] 1979

LAB: VOLKSWAGEN FUEL: AMOCO VEH: PEUGEOT 504 COUPE VID: 267/501 INERTIA WT: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	METHOD	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	THP	BARO	HUM	NXFC	DBL	RSL	TLOSS
6-[illegible]-78	18-1	[illegible] 2	0.190	1.11	0.83	215.	47.0		0 6	0.0	0.0	29.72	60.94	0.94			
	18-2	[illegible] 2	0.190	1.09	0.85	213.	47.5										
6-[illegible]-78	20-1	[illegible] 25	0.177	1.04	0.81	209.	48.4		0 6	0.0	0.0	29.78	60.94	0.94			
	20-2	[illegible] 25	0.196	1.10	0.83	209.	48.4										
			I<------(G/MI)------>I				(MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->I		
MEAN			0.188	1.08	0.83	212.	47.8					29.75	60.94	0.94			
STANDARD DEV.			.0080	0.041	.016	3.	0.7					0.038	0.0	.001			
C.V.			4.3	3.8	2.0	1.4	1.5					0.1	0.0	0.1			
DIFF.			-21.	44.	1.	0.	-8.5					2.	-15.	-5.			

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible] 1979

LAB: VOLKSWAGEN FUEL: HOWELL VEH: PEUGEOT CORP. CK25 VIN: 267[illegible]91 INERTIA T: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	MEID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	GBL	BSL	TLOSS
6- 7-78	22-1	C 25	0.079	0.55	0.83	203.	50.1		0 6	0.0	0.0	29.72	62.14	0.94			
	22-2	C 25	0.067	0.53	0.83	206.	48.7										
6- 7-78	24-1	C 25	0.060	0.50	0.87	209.	48.7		0 6	0.0	0.0	29.72	60.94	0.94			
	24-2	C 25	0.070	0.54	0.87	208.	48.9										
			I<------(G/MI)------>I				(MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		
MEAN				0.069	0.53	0.85	207.	49.1				29.72	61.54	0.94			
STANDARD DEV.				.0079	0.022	.023	3.	0.7				0.016	0.849	.004			
C.V.				11.4	4.1	2.7	1.3	1.4				0.1	1.4	0.4			
DIFF.				-71.	-29.	4.	7.	-6.1				2.	-15.	-5.			

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible] 1979

LAB: RICARDO FUEL: AMOCO VEH: PEUGEOT [illegible] CB25 VIN: 2677501 INERTIA T: 3500 ACTUAL HP: 12.3

DATE	TE	IND	[illegible]	MEID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXEC	DBL	HSL	TLOSS
6-14-78	30-1	[illegible]25	0.151	0.73	0.83	203.	49.9		0	0.0	0.0	30.09	58.49	0.93				
	30-2	[illegible]25	0.160	0.77	0.80	197.	51.4											
6-14-78	32-1	[illegible]25	0.173	0.83	0.84	203.	49.8		0	0.0	0.0	30.09	49.24	0.89				
	32-2	[illegible]25	0.169	0.81	0.81	197.	51.4											
			I<------(G/MI)----->				I (MPG)						(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		
MEAN			0.163	0.78	0.82	200.	50.6					30.09	53.87	0.91				
STANDARD DEV.			.0078	0.044	.018	3.	0.9					0.016	6.541	.025				
C.V.			6.0	5.6	2.2	1.7	1.8					0.1	12.1	2.8				
DIFF.			-31.	4.	-0.	3.	-3.2					4.	-25.	-8.				

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR 2, 1979

LAB: RICARDO FUEL: HOWELL VEH: PEUGEOT 504, CR25 VIN: 2677501 INERTIA I: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	MPID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DBL	MSL	TLOSS
6-13-78	26-1	CS	0.101	0.44	0.86	205.	49.7	0		0.0	0.0	30.22	47.35	0.88			
	26-2	CS	0.104	0.44	0.82	195.	52.1										
6-13-78	28-1	CS	0.121	0.53	0.84	204.	49.8	0		0.0	0.0	30.22	50.57	0.90			
	28-2	CS	0.133	0.53	0.81	197.	51.5										
			<------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		
MEAN			0.115	0.49	0.83	200.	50.8					30.22	48.96	0.89			
STANDARD DEV.			.0150	0.051	.022	5.	1.2					0.016	2.277	.009			
C.V.			13.1	10.5	2.7	2.5	2.4					0.1	4.7	1.0			
DIFF.			-52.	-45.	1.	4.	-2.9					4.	-32.	-10.			

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LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible], 1979

LAB: SOUTHWEST RES INST FUEL: AMOCO VEH: PEUGEOT 504 R. CR25 VIN: 2677501 INERTIA T: 3500 ACTUAL H/C: 124.3

DATE	FE TNO	TYPE	MEID	CO	NOx	CO2	FE	DRIVER	DYNO	ODO	THP	BARO	HUM	NxEC	DRL	HSL	TLOSS
10-24-78	13-1	CR25	0.100	0.63	0.63	182.	55.5	1	SWRI	6030.0	10.4	29.28	51.07	0.90			
10-24-78	15-1	CR25	0.140	0.66	0.59	173.	58.2	1	SWRI	6044.0	10.4	29.24	53.96	0.91			
10-24-78	16-1	CR25	0.140	0.70	0.63	183.	55.1	1	SWRI	6046.0	10.4	29.24	53.96	0.91			
			I<-------(G/MI)------>I				(MPG)					(IN-HG)	(GRAINS /LB)		I<---(GPA IS)---->I		
MEAN			0.127	0.66	0.62	179.	56.3					29.25	53.00	0.91			
STANDARD DEV.			.0231	0.035	.023	6.	1.7					0.026	1.668	.006			
C.V.			18.2	5.3	3.7	3.1	3.0					0.1	3.1	0.7			
DIFF.			-47.	-12.	-25.	-7.	7.5					1.	-27.	-8.			

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR [illegible] 1979

LAB: SOUTHWEST RES INST FUEL: HOWELL VEH: PEUGEOT [illegible] CR25 VIN: 2677501 INERTIA WT: 3500 ACTUAL RHP: 12.3

DATE	TEST NO	TYPE	REID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	CBL	BSL	TLOSS
10-24-78	22-1	[illegible]25	0.070	0.42	0.69	193.	52.5	1 SORI	6065.0	10.4	29.25	56.80	0.92				
10-24-78	23-1	[illegible]25	0.080	0.49	0.66	188.	53.8	1 SORI	6063.0	10.4	29.25	55.59	0.92				
10-24-78	25-1	[illegible]25	0.090	0.48	0.70	193.	52.4	1 SORI	6080.0	10.4	29.25	58.47	0.93				
10-24-78	26-1	[illegible]25	0.090	0.54	0.65	188.	53.8	1 SORI	6082.0	10.4	29.29	56.80	0.92				
			<------(G/MI)----->				(MPG)				(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->			
MEAN			0.082	0.48	0.67	191.	53.1				29.26	56.91	0.92				
STANDARD DEV.			.0096	0.049	.024	3.	0.8				0.019	1.182	.005				
C.V.			11.6	10.2	3.5	1.5	1.5				0.1	2.1	0.5				
DIFF.			-65.	-36.	-18.	-1.	1.6				1.	-21.	-7.				

LAB CORRELATION SUMMARY - TEST DATA PROCESSED: MAR [illegible] 1979

LAB: SOUTHWEST RES INST FUEL: AMOCO VEH: PONTIAC CORV. CR25 VIN: 2677501 INERTIA T: 3500 ACTUAL H: 12.3

DATE	TEST NO	TYPE	RFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DRL	HSL	TLOSS
10-24-78	13-1	[illegible]25	0.098	0.63	0.63	192.	55.5	1 S[illegible]I	6030.0		10.4	29.28	51.07	0.90			
10-24-78	15-1	[illegible]25	0.136	0.66	0.59	173.	58.2	1 S[illegible]I	6044.0		10.4	29.24	53.96	0.91			
10-24-78	16-1	[illegible]25	0.130	0.70	0.63	183.	55.1	1 S[illegible]I	6045.0		10.4	29.24	53.96	0.91			
			I<------(G/MI)----->				I (MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->		
MEAN			0.117	0.66	0.62	179.	56.3					29.25	53.00	0.91			
STANDARD DEV.			.0231	0.035	.023	6.	1.7					0.026	1.668	.006			
C.V.			19.6	5.3	3.7	3.1	3.0					0.1	3.1	0.7			
DIFF.			-51.	-12.	-25.	-7.	7.6					1.	-27.	-8.			

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR 24 1979

LAB: SOUTHWEST RES INST FUEL: HOWELL VEH: PEUGEOT 504R. CR25 VIN: 2677561 INERTIA WT: 3500 ACTUAL HP: 17.3

DATE	TEST NO	TYPE	WEID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXFC	DBL	HSL	TLOSS
			<-------(G/MI)------->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(GRAMS)--->		
10-24-78	22-1	CR25	0.050	0.42	0.69	193.	52.5		1 SW1	6066.0	10.4	29.25	56.80	0.92			
10-24-78	23-1	CR25	0.060	0.49	0.66	188.	53.8		1 SW1	6068.0	10.4	29.25	55.59	0.92			
10-24-78	25-1	CR25	0.070	0.48	0.70	193.	52.4		1 SW1	6080.0	10.4	29.25	58.47	0.93			
10-24-78	26-1	CR25	0.060	0.54	0.65	188.	53.8		1 SW1	6082.0	10.4	29.29	56.80	0.92			
MEAN			0.060	0.48	0.67	191.	53.1					29.26	56.91	0.92			
STANDARD DEV.			.0082	0.049	.024	3.	0.8					0.018	1.182	.005			
C.V.			13.6	10.2	3.5	1.5	1.5					0.1	2.1	0.5			
DIFF. %			-75.	-36.	-18.	-1.	1.6					1.	-21.	-7.			

LAB CORRELATION SUMMARY - TEST DAT

PROCESSED: MAR [illegible] 1979

LAB: SOUTHWEST RES INST FUEL: AMOCO VEH: PEUG 01 COPR. GR25 VIN: 2677501 INERTIA WT: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	NFID	CO	NOX	CO2	FE	DRIVER	DYNO	ODO1	IHP	BARO	HUM	NXFC	OBL	HSL	TLOSS
10-24-78	13-1	25	0.120	0.63	0.63	182.	55.5	1	S CI	6030.0	10.4	29.28	51.07	0.90			
10-24-78	15-1	25	0.160	0.66	0.59	173.	58.2	1	S CI	6044.0	10.4	29.24	53.96	0.91			
10-24-78	16-1	25	0.160	0.70	0.63	183.	55.1	1	S CI	6045.0	10.4	29.24	53.96	0.91			
			I<------(G/MI)------>I				(MPG)					(IN-HG)	(GRAINS /LB)		I<---(GRAMS)--->I		
MEAN			0.147	0.66	0.62	179.	56.3					29.25	53.00	0.91			
STANDARD DEV.			.0231	0.035	.023	6.	1.7					0.026	1.668	.000			
C.V.			15.7	5.3	3.7	3.1	3.0					0.1	3.1	0.7			
DIFF.			-38.	-12.	-20.	-7.	7.0					1.	-27.	-8.			

LAB CORRELATION SUMMARY - TEST DATA

PROCESSED: MAR • 1979

LAB: SOUTHWEST RES INST FUEL: HOWELL VEH: PEUGEOT CORP. CR25 VIN: 2677501 INERTIA WT: 3500 ACTUAL HP: 12.3

DATE	TEST NO	TYPE	REID	CO	NOX	CO2	FE	DRIVER	DYNO	ODOM	IHP	BARO	HUM	NXEC	FBL	PSL	TLOSS
10-24-78	22-1	CH25	0.070	0.42	0.69	193.	52.5		1 S RI	6066.0	10.4	29.25	56.80	0.92			
10-24-78	23-1	CH25	0.090	0.49	0.66	188.	53.9		1 S RI	6066.0	10.4	29.25	55.59	0.92			
10-24-78	25-1	CH25	0.090	0.48	0.70	193.	52.4		1 S RI	6080.0	10.4	29.25	58.47	0.93			
10-24-78	26-1	CH25	0.100	0.54	0.65	188.	53.8		1 S RI	6082.0	10.4	29.29	56.80	0.92			
			<------(G/MI)----->				(MPG)					(IN-HG)	(GRAINS /LB)		<---(G/A-IS)--->		
MEAN			0.087	0.48	0.67	191.	53.1					29.26	56.91	0.92			
STANDARD DEV.			.0126	0.049	.024	3.	0.8					0.018	1.183	.005			
C.V.			14.4	10.2	3.5	1.5	1.5					0.1	2.1	0.5			
DIFF. %			-63.	-36.	-18.	-1.	1.6					1.	-21.	-7.			

APPENDIX 3

Southwest Research Institute
Letter Detailing System Modifications

SOUTHWEST RESEARCH INSTITUTE
6220 CULEBRA ROAD • POST OFFICE DRAWER 28510 • SAN ANTONIO, TEXAS 78284

February 16, 1979

Mr. Dick Lawrence
Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, Michigan 48105

Dear Dick:

The results from the EPA-SwRI HFID HC correlation are being finialized and should be completed in the next week. In order that you may include the some of the highlights of those results as they pertain to the Peugeot HFID HC correlation I have prepared an abbreviated summary.

1. During the SwRI-EPA HFID HC correlation study conducted at EPA-AA, differences between SwRI and EPA were demonstrated but not to the magnitude of that shown in the Peugeot correlation. Two Beckman 402 and one SwRI built HFID (Varian detector) were used in this study. A possible reason for the inability to duplicate the magnitude of difference could be due to lack of exact duplication of the sampling interface. This was due to the fact that the Peugeot tests were conducted on a CVS, whereas the SwRI-HC studies were conducted with a dilution tunnel.

2. A variety of experiments were conducted to determine those items which could cause the differences in the HC measurements. These tests also included a gasoline Chevette, Mercedes 300D, Peugeot 504 and Oldsmobile diesel. The items that were found to significantly effect the HC emissions were calibration/sample delivery, calibration gas differences, burner optimization and differences in burner response (Varian vs Beckman). Of the aforementioned items, it was felt that reading the HC background was the most critical and most susceptible to erroneous results. By incorporating the EPA overflow calibration delivery system, using EPA named gases and optimizing the HFID burners, a correlation was established using the three diesel cars on two Beckman 402 analyzers. The SwRI FID would not correlate to the Beckman 402 and typically gave values about 75 percent of those from the Beckman 402, even though the detector was linear and gave equivalent results on gasoline exhaust.

3. When the Peugeot correlation vehicle was tested at SwRI, three HFID analyzers (2 Beckman 402 and one SwRI) units were used. All analyzers had a separate sample interface along with heating controls for lines, filters, etc., so all read the sample independently. Due to the test schedule time constraints, a manifold system was developed to enable reading the background bag on all three analyzers simultaneously. Although that was not the way it is typically done, background bag readings were not suspect at the time of the tests. During tests of EPA it was determined that using the manifold system could cause higher background readings than would be observed from a continuous tunnel background reading. The exact reason for this is not totally understood, but by using the EPA overflow system, background bags and continuous background from the tunnel would read equivalent.

In addition, tests conducted with the Peugeot at SwRI in October, 1978, new tedlar bags were used for the tests. Experiments have determined that new tedlar bags can have 1-2 ppmC residual HC in the bags. Again this would have contributed to the higher background reading.

Upon reviewing several of the HC traces for the Peugeot vehicle (at SwRI) it was confirmed that the background bag consistently read higher than the continuous background from the tunnel. These differences were more pronounced with the two Beckman 402 HFID analyzers than with the SwRI analyzer. Knowing that the background reading was in error, the results of the Peugeot correlation with the two Beckman 402 HFID's were recalculated using the background bag from the SwRI FID and the bag cart Beckman 400. The results of these are presented for the HFTP on Figure 1 and 25 mph steady state cruise on Figure 2. These bar graphs are presented to make direct comparisons to EPA for all three of the HFID analyzers used in the correlation study.

In general, using the SwRI FID background values with the two Beckman 402 analyzers helped but not to the extent of using the Beckman 400 backgrounds. Since it is felt that Beckman 400 backgrounds are probably the most accurate, discussion of comparisons to EPA will be limited to that set of date. For the HFTP tests, the Beckman 400 background corrected results indicated that both Beckman 402's read 97-98 precent of EPA with the Amoco fuel and 105-107 percent of EPA with the Howell fuel. The SwRI FID (Varian detector) gave 72 percent of EPA with the Amoco fuel and 74 percent of EPA with the Howell fuel on the HFTP with the Beckman 400 background correction.

Both Beckman 402 HFID analyzers read 70-72 percent of EPA with the Amoco fuel at the 25 mph cruise. These same two analyzers gave 85 and 112 percent of EPA with the Howell fuel. There was some concern over the differences between the two Beckman 402 analyzers with the Howell fuel, considering the SwRI background corrections gave 106 and 95 percent of EPA. Of the four cycle and fuel combinations only the Amoco fuel at 25 mph steady state could not be improved to be within 15 percent of EPA.

4. Based on the results of the SwRI-EPA HFID HC correlation study, it is felt by implemented the EPA overflow calibration system, optimizing the burner, renaming the span gases that SwRI and EPA would obtain the same HC values on the Beckman 402 analyzers. There is a difference in response between the Beckman 402 detector and the Varian detector with the Varian detector reading about 25 percent less than the Beckman 402 FID detectors. SwRI is in the process of implementing those aforementioned items to assure HC correlation with EPA. All SwRI HFID units will be converted to Beckman 402 HFID burners to insure correlation between HC analyzers in-house at SwRI.

I think that these comments reflect the general feeling about the HFID HC correlation between SwRI and EPA of Gene Danielson (EPA) and myself. If you require any additional input, please advise and I will be happy to respond.

Very truly yours,

Harry E. Dietzmann

Harry E. Dietzman
Senior Research Chemist
Department of Emissions Research

HED/sat

Attachment

cc: Gene Danielson
Merrill Korth
Karl Springer

461510

Figure 1